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1963 FIELD EVALUATION OF CHEMICALS FOR THEIR HERBICIDAL PROPERTIES

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Preliminary Data Not for Publication

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Chemical*	Designation	Company Code	Source**	Table Numbers
4,5,7-trichlorobenzthiadiazole-2,1,3	-	TH-052H	THC	4, 20, 21
isopropyl N-(3-chlorophenyl)carbamate	CIPC	-	PPG	18, 20, 21
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alkanolamine salts of 4,6-dinitro-o-sec-butylphenol	DNBP	-	DCC	19, 20, 21

* Nomenclature based on Weed Society of America Terminology Committee Report.

** Abbreviation of Contributors

List of Contributors

Abbreviation	Source of Chemicals	Contact
ACP	Amchem Products, Incorporated, Ambler, Pennsylvania	J. H. Kirch
BAD	Badische Anilin- & Soda Fabrik AG., Ludwigshafen Am Rhein, Germany (and) BASF Colors & Chemicals Incorporated, New York 17, New York	H. C. Lehmann
DCC	Dow Chemical Company, Midland, Michigan	L. P. Southwick
EID	E. I. duPont de Nemours & Company, Wilmington 98, Delaware	R. W. Varner
HPC	Hercules Powder Company, Wilmington 99, Delaware	E. N. Woodberry
NFM	Niagara Chemical Division, Food Machinery and Chemical Corporation, Middleport, New York	B. C. Dickinson
PPG	Pittsburgh Plate Glass Corporation, Pittsburgh 22, Pennsylvania	W. C. McConnell
STF	Stauffer Chemical Company, New York 17, New York	A. B. Lindquist
THC	Thompson-Hayward Chemical Company, Kansas City, Kansas	L. S. DeAtley

1963 FIELD EVALUATION OF CHEMICALS FOR THEIR HERBICIDAL PROPERTIES

W. A. Gentner 1/

The results of the 1963 preliminary field evaluation studies of several chemicals for their herbicidal properties are presented in this report.

The objectives of the herbicide evaluation project are (1) to develop herbicide evaluation techniques, (2) to determine the responses of crops and weeds to preemergence and postemergence treatments, (3) to obtain preliminary information on the herbicidal properties of new chemicals, (4) to study the relationships between chemical structure and herbicidal activity, and (5) to make this information available to U. S. Department of Agriculture personnel and cooperating state and chemical industry weed research workers.

These studies are of a preliminary nature. Plots were unreplicated and the results should be analyzed and used accordingly.

MATERIALS AND METHODS

Chemicals were applied using the logarithmic sprayer in the field evaluation of several chemicals for their herbicidal properties.

Studies were conducted on a Codorus silt loam. Six hundred pounds per acre of a 5-10-5 fertilizer were applied prior to planting. A mixture of malathion and methoxychlor was used in scheduled spraying to control insects.

A list of common and binomial names of test species, varieties, and heights at time of postemergence treatment is given on page 15.

Chemical application rates are given on an active ingredient basis. Herbicidal properties of compounds will be discussed by treatment type under the following catagories:

(1) Small-seeded Legume Crops: alfalfa, birdsfoot trefoil, red clover.

(2) Cereals and Forage Crops: buckwheat, field corn, oats, sorghum.

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(3) Oilseed and Fiber Crops: cotton, flax, peanuts, safflower, soybeans.

(4) Sugar Crops: sugarbeets.

(5) Vegetable Crops: cabbage, lima beans, onions, peas, snap-beans, squash, sweet corn, tomatoes, turnips.

(6) Soil Sterilants

Twenty-two crops and four weeds were seeded as test species in the logarithmic plots. Plots consisted of 6 beds 4 ft wide and 100 ft long. Each bed contained 4 test species. Birdsfoot trefoil and red clover were overseeded on one bed by means of a centrifugal seeder and covered by means of a plank-drag. Crop species were seeded at the recommended depth at higher than recommended seeding rates to provide large populations.

Test species were seeded on May 14.

Preemergence treatments were applied on May 15 and data were recorded on June 14.

Postemergence treatments were applied on June 20 and data were recorded on July 5.

Rates of application presented in tables 1-19 represent the complete range of application of each compound. Rate of chemical application varied logarithmically from an initial high rate down to and including one-sixteenth of the high level.

Crop tolerance and weed susceptibility were recorded at the high level of application and at each of the 4 succeeding half-dosage distances using a 0-100 injury scale, where 0 indicates no effect and 100 death of the test species.

The term grasses in these tables refers to an indigenous mixture predominated by crabgrass (Digitaria sanguinalis), foxtail (Setaria spp.), and barnyardgrass (Echinochloa crusgalli). The term broadleaved weeds refers to an indigenous mixture predominated by ragweed (Ambrosia artemisiifolia), purslane (Portulaca oleracea), smartweed (Polygonum pennsylvanicum), and velvet leaf (Abutilon theophrasti). Nutsedge (Cyperus esculentus) infestation of this field was erratic; special notes were recorded where the stand was sufficient to indicate nutsedge response to chemical application.

Rainfall and temperature prior to and after treatment applications.

Days before and after treatment	Total rainfall	Min. av. temp.	Max. av. temp.
	inches	°F.	°F.
Chemicals applied preemergence May 15, 1963			
30 days prior to treatment	1.31	42	72
7 days prior to treatment		48	78
7 days after treatment	.77	49	74
30 days after treatment	4.99	54	75
Chemicals applied postemergence June 20, 1963			
30 days prior to treatment	4.65	54	76
7 days prior to treatment	.24	53	78
7 days after treatment	.50	51	84
30 days after treatment	2.74	57	86

RESULTS AND DISCUSSION

This is a progress report in which preliminary data are presented to serve as a guide to research workers in the use and development of prospective herbicides.

Data indicative of the responses of test species to prospective herbicides included in field studies are presented in tables 1-19 and are summarized in tables 20 and 21.

Small-seeded Legume Crops

One or more broadleaved weeds and weed-grasses were controlled in one or several of the small-seeded legume crops included in the logarithmic plot studies by the following chemicals applied as preemergence treatments:

(1) 3-cyclohexyl-5,6-trimethyleneuracil (table 2).

(2) 2,6-di-*tert*-butyl-*p*-tolyl methylcarbamate (table 7).

(3) α-carboisopropoxyethyl *N*-(3-chlorophenyl)carbamate (table 11).

(4) ethyl *N*-ethyl-*N*-cyclohexylthiolcarbamate (table 12).

(5) 4-chlorobenzenesulfono-2-toluidine (table 13).

(6) N-(β-O,O-diisopropyldithiophosphoryethyl)-benzenesulfonamide (table 15).

(7) CIPC (table 18).

One or more broadleaved weeds but not weed-grasses were controlled satisfactorily in the small-seeded legume crops included in this study by the preemergence application of 3,5-diiodo-4-hydroxybenzonitrile, dimethylallyl-3-chlorophthalate, and DNBP (tables 5, 6, 19).

One or more weed-grasses but not broadleaved weeds were controlled in this crop group by the preemergence application of α-carboisopropoxyethyl N-phenylcarbamate (table 10).

Postemergence applications of dimethylallyl-3-chlorophthalate and propynyl N-(3-chlorophenyl)carbamate controlled one or more broadleaved weeds in alfalfa, birdsfoot trefoil, and red clover without serious damage to the small-seeded legume crops (tables 6, 8).

Cereals and Forage Crops

The following chemicals applied as preemergence treatments appear promising for the control of one or more broadleaved weeds and weed-grasses in one or more of the cereal and/or forage crops:

(1) 3-cyclohexyl-5,6-trimethyleneuracil (table 2).

(2) 2,6-di-tert-butyl-p-tolyl methylcarbamate (table 7).

(3) ethyl N-ethyl-N-cyclohexylthiolcarbamate (table 12).

(4) mixed 2-(X,X-dichlorobenzylthio)-4,6-dimethylpyrimidine (table 14).

(5) N-(β-O,O-diisopropyldithiophosphoryethyl)-benzenesulfonamide (table 15).

(6) DNBP (table 19).

One or more broadleaved weeds but not weed-grasses were controlled in one or more crops of this group by preemergence applications of the following chemicals:

(1) 4,5,7-trichlorobenzthiadiazole-2,1,3 (table 4).

(2) 3,5-diiodo-4-hydroxy benzonitrile (table 5).

(3) dimethylallyl-3-chlorophthalate (table 6).

(4) propynyl N-(3-chlorophenyl)carbamate (table 8).

(5) 4-chlorobenzenesulfono-2-toluidine (table 13).

(6) CIPC (table 18).

One or more weed-grasses but not broadleaved weeds was controlled in the cereals and forage crops included in this study by the preemergence application of α-carboisopropoxyethyl N-phenylcarbamate (table 10).

The postemergence application of the following chemicals controlled one or more broadleaved weeds but not weed-grasses in several of the cereals and forage crops:

(1) dimethylallyl-3-chlorophthalate (table 6).

(2) propynyl N-(3-chlorophenyl)carbamate (table 8).

(3) 4-amino-3,5,6-trichloropicolinic acid (table 16).

(4) sec butyl N-(3-chlorophenyl)carbamate (table 9).

(5) α-carboisopropoxyethyl N-(3-chlorophenyl)carbamate (table 11).

(6) ethyl N-ethyl-N-cyclohexylthiolcarbamate (table 12).

(7) 4-chlorobenzenesulfono-2-toluidine (table 13).

(8) N-(β-O,O-diisopropyldithiophosphoryethyl)-benzenesulfonamide (table 15).

(9) 2,4-D (table 17).

(10) CIPC (table 18).

Oilseed and Fiber Crops

One or more broadleaved weeds but not weed-grasses were controlled in the oilseed and fiber crops used in this study by preemergence applications of:

(1) 4,5,7-trichlorobenzthiadiazole-2,1,3 (table 4).

(2) 3,5-diiodo-4-hydroxy benzonitrile (table 5).

(3) dimethylallyl-3-chlorophthalate (table 6).

(4) mixed 2-(X,X-dichlorobenzylthio)-4,6-dimethylpyrimidine (table 14).

(5) DNBP (table 19).

Conversely, one or more weed-grasses but not broadleaved weeds were controlled in these crops by preemergence applications of α-carboisopropoxyethyl N-phenylcarbamate (table 10).

The postemergence application of CIPC resulted in the control of one or more broadleaved weeds and/or weed-grasses in peanuts (table 18).

Broadleaved weeds but not weed-grasses were controlled in one to several of the oilseed and fiber crops by postemergence applications of the following:

(1) 3,5-diiodo-4-hydroxy benzonitrile (table 5).

(2) dimethylallyl-3-chlorophthalate (table 6).

(3) propynyl N-(3-chlorophenyl)carbamate (table 8).

(4) CIPC (table 18).

(5) DNBP (table 19).

Weed-grasses were satisfactorily controlled in flax and peanuts by postemergence applications of 5-bromo-6-methyl-3-phenyluracil (table 1).

Sugar Crops

Broadleaved weeds and weed-grasses were controlled in sugarbeets, the only sugar crop included in these studies, by preemergence applications of the following herbicides:

(1) 3-cyclohexyl-5,6-trimethyleneuracil (table 2).

(2) 1-phenyl-4-amino-5-chloropyridazone-6 (table 3).

(3) 2,6-di-tert-butyl-p-tolyl methylcarbamate (table 7).

(4) ethyl N-ethyl-N-cyclohexylthiolcarbamate (table 12).

(5) 4-chlorobenzenesulfono-2-toluidine (table 13).

Broadleaved weeds but not weed-grasses were satisfactorily controlled in sugarbeets by the preemergence application of 3,5-diiodo-4-hydroxy benzonitrile, dimethylallyl-3-chlorophthalate, and CIPC (tables 5,6,18).

The preemergence application of α-carboisopropoxyethyl N-phenylcarbamate satisfactorily controlled one or more weed-grasses in sugarbeets (table 10).

Postemergence applications of propynyl N-(3-chlorophenyl)carbamate resulted in satisfactory control of one or more broadleaved weeds in sugarbeets (table 8). No other chemical included in this study appears promising for postemergence weed control in this crop.

Vegetable Crops

Broadleaved weeds and/or weed-grasses were controlled in one or more of the vegetable crops by preemergence applications of the following herbicides.

(1) 4,5,7-trichlorobenzthiadiazole-2,1,3 (table 4).

(2) 3,5-diiodo-4-hydroxy benzonitrile (table 5).

(3) dimethylallyl-3-chlorophthalate (table 6).

(4) 2,6-di-tert-butyl-p-tolyl methylcarbamate (table 7).

(5) sec-butyl N-(3-chlorophenyl)carbamate (table 9).

(6) α-carboisopropoxyethyl N-phenylcarbamate (table 10).

(7) α-carboisopropoxyethyl N-(3-chlorophenyl)carbamate (table 11).

(8) ethyl N-ethyl-N-cyclohexylthiolcarbamate (table 12).

(9) 4-chlorobenzenesulfono-2-toluidine (table 13).

(10) mixed 2-(X,X-dichlorobenzylthio)-4,6-dimethylpyrimidine (table 14).

(11) N-(β-O,O-diisopropyldithiophosphoryethyl)benzenesulfonamide (table 15).

(12) CIPC (table 18).

(13) DNBP (table 19).

As postemergence treatments, the following compounds controlled one or more broadleaved weeds in one or more of the vegetable crops:

(1) dimethylallyl-3-chlorophthalate (table 6).

(2) propynyl N-(3-chlorophenyl)carbamate (table 8).

(3) 4-amino-3,5,6-trichloropicolinic acid (table 16).

(4) 2,4-D (table 17).

(5) CIPC (table 18).

(6) DNBP (table 19).

Soil Sterilants

The following herbicides possess sufficient general phytotoxicity when applied as preemergence treatments to be functional as soil sterilants:

(1) 5-bromo-6-methyl-3-phenyluracil (table 1).

(2) 3-cyclohexyl-5,6-trimethyleneuracil (table 2).

(3) 1-phenyl-4-amino-5-chloropyridazone-6 (table 3).

(4) 4-amino-3,5,6-trichloropicolinic acid (table 16).

The 5-bromo-6-methyl-3-phenyluracil also possessed sufficient general postemergence herbicidal activity to warrant further study as a soil sterilant (table 1).

Residual Activity of Herbicides

The areas used to study the herbicidal properties of chemicals were plowed to a depth of 6-8 inches and disked to a depth of 4 inches on September 18-19. A mixture of rye and vetch was planted on September 20 to bioassay for the residual activity of herbicides included in these studies.

The experimental areas were evaluated on November 5 and it was observed that the 3-4 lb/A rate of 5-bromo-6-methyl-3-phenyluracil applied preemergence had persisted and reduced the stand of rye and vetch by 70 and 100 percent, respectively.

Remarks on Structure and Activity

Four variously substituted N-(3-chlorophenyl)carbamates were included in this study. Varying substituents of this basic moiety arranged from most to least active as preemergence sprays are:

(1) isopropyl-

(2) sec-butyl-

(3) α-carboisopropoxyethyl-

(4) propynyl-

The propynyl N-(3-chlorophenyl)carbamate, although it is not generally of a high order of phytotoxic character, is very selective among the grasses. Oats and ryegrass were killed preemergence by the 8 lb/A rate while other crops, including several other grasses were not noticeably damaged.

Chlorination of α-carboisopropoxyethyl N-phenylcarbamate resulted in an increase in the general phytotoxic properties of the herbicide.

Species and Varietal Names of Crops and Weeds

	Common Name	Scientific Name	Variety	Height of test species in inches at time of postemergence treatment
1.	Alfalfa	Medicago sativa L.	Buffalo	5
2.	Birdsfoot trefoil	Lotus corniculatus L.	Italian	3
3.	Buckwheat	Fagopyrum esculentum Moench.	- - - -	17
4.	Cabbage	Brassica oleracea v. capitata L.	Late Flat Dutch	6
5.	Corn, Field	Zea Mays L.	US 13	20
6.	Corn, Sweet	Zea mays v. rugosa Bonaf.	Iochief	19
7.	Cotton	Gossypium hirsutum L.	Coker 100 WR	6
8.	Flax	Linum usitatissimum L.	Cascade	8
9.	Lima beans	Phaseolus limensis Macf.	Fordhook 242	8
10.	Oats	Avena sativa L.	Clinton 59	18
11.	Onions	Allium sativum L.	Evergreen Bunching	5
12.	Peanuts	Arachis hypogaea L.	Spanish	3
13.	Peas	Pisum sativum L.	Laxton Progress	15
14.	Red Clover	Trifolium pratense L.	Kenland	4
15.	Safflower	Carthamus tinctorius L.	Pacific 2	15
16.	Snapbeans	Phaseolus vulgaris L.	Top Crop	13
17.	Sorghum	Sorghum vulgare Pers.	Milo	14
18.	Soybeans	Glycine max (L.) Merr.	Clark	9
19.	Squash	Cucurbita pepo L.	Early Summer Crookneck	12
20.	Sugar beets	Beta vulgaris L.	SP 55600-01	4
21.	Tomatoes	Lycopersicon esculentum Mill.	Rutgers	6
22.	Turnips	Brassica campestris L.	Purple Top White Globe	8
23.	Crabgrass	Digitaria sanguinalis (L.) Scop.	- - - -	5
24.	Ryegrass	Lolium multiflorum Lam.	Annual Italian	7
25.	Pigweed	Amaranthus retroflexus L.	- - - -	1
26.	Rape	Brassica napus L.	- - - -	10

TABLE 1.--Logarithmic Rate Plot Results

Chemical	5-bromo-6-methyl-3-phenyluracil									
Application	Preemergence					Postemergence				
Rate lb/A	4	2	1	1/2	1/4	4	2	1	1/2	1/4
Crops										
Alfalfa	100	100	100	100	100	100	95	40	20	10
B-ft trefoil	100	100	100	100	95	100	95	40	20	10
Buckwheat	100	100	100	100	95	100	100	100	90	50
Cabbage	100	100	95	90	50	95	95	90	60	20
Corn, field	100	100	95	90	60	100	90	40	20	10
Corn, sweet	100	100	95	90	60	100	90	40	20	10
Cotton	100	100	100	100	90	100	100	100	40	10
Flax	50	30	10	0	0	80	50	30	10	0
Lima beans	100	100	100	95	80	100	100	100	60	40
Oats	100	100	100	100	50	100	90	40	10	0
Onions	100	100	100	100	100	100	100	100	60	40
Peanuts	100	100	95	95	95	100	70	30	10	0
Peas	100	100	100	95	80	100	100	100	60	40
Red Clover	100	100	100	100	95	100	95	40	20	10
Safflower	100	10	0	0	0	100	100	100	100	40
Snapbeans	100	100	100	95	60	100	100	100	60	40
Sorghum	100	100	95	80	50	100	70	40	10	0
Soybeans	100	100	100	100	95	100	100	80	40	10
Squash	100	100	100	90	50	100	100	95	60	40
Sugarbeets	100	100	100	95	50	100	90	60	20	0
Tomatoes	100	100	100	100	95	100	100	100	60	30
Turnips	100	100	100	95	70	100	90	80	30	10
Crop Tox. Av.	98	93	90	87	69	99	92	70	35	19
Weeds *										
Crabgrass	100	100	100	100	100	100	95	60	40	10
Ryegrass	100	100	100	70	20	100	100	100	40	10
Other Grasses	100	100	95	95	95	100	95	60	40	10
Mustard	100	100	100	100	80	95	95	40	20	0
Pigweed	100	40	10	10	50	40	40	20	10	0
Other brdlf	100	90	80	90	90	90	60	40	10	0
Weed Tox. Av.	100	89	81	78	73	88	81	53	26	5
Total Tox. Av.	98	92	88	85	70	96	89	65	37	16

* Note 100 percent control of nutsedge at 2 and 1 lb/A pre- and postemergence, respectively.

TABLE 2.--Logarithmic Rate Plot Results

Chemical	3-cyclohexyl-5,6-trimethyleneuracil									
Application	Preemergence					Postemergence				
Rate lb/A	4	2	1	1/2	1/4	4	2	1	1/2	1/4
Crops										
Alfalfa	95	95	80	60	30					
B-ft trefoil	100	95	95	70	60					
Buckwheat	100	100	100	90	40					
Cabbage	100	100	100	100	50					
Corn, field	95	90	80	40	30					
Corn, sweet	95	90	80	40	40					
Cotton	95	80	70	50	50					
Flax	95	90	70	20	20					
Lima beans	100	100	100	95	90					
Oats	100	100	100	95	20					
Onions	100	100	100	100	95					
Peanuts	100	100	80	50	20					
Peas	100	100	100	70	40					
Red Clover	100	100	100	100	95					
Safflower	95	80	40	40	30					
Snapbeans	100	100	95	70	40					
Sorghum	95	90	50	40	20					
Soybeans	100	100	95	90	40					
Squash	100	100	100	80	50					
Sugarbeets	90	80	60	30	20					
Tomatoes	100	100	100	100	80					
Turnips	100	100	100	80	20					
Crop Tox. Av.	98	95	86	69	46					
Weeds*										
Crabgrass	100	100	100	70	30					
Ryegrass	95	95	90	90	90					
Other Grasses	100	100	100	100	100					
Mustard	100	100	100	100	90					
Pigweed	95	95	95	95	70					
Other brdlf	95	95	90	80	80					
Weed Tox. Av.	98	98	96	89	77					
Total Tox. Av.	98	95	88	73	51					

Less than 10% as active as 2,4-D

* Note 90 percent control of nutsedge from 1-4 lb/A preemergence.

TABLE 3.--Logarithmic Rate Plot Results

Chemical	1-phenyl-4-amino-5-chloropyridazone-6									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	100	100	80	30	30					
B-ft trefoil	100	90	80	40	30					
Buckwheat	100	95	50	20	0					
Cabbage	100	95	90	60	20					
Corn, field	40	40	40	40	10					
Corn, sweet	40	40	40	40	10					
Cotton	90	60	60	40	10					
Flax	100	60	50	10	0					
Lima beans	100	95	95	90	30					
Oats	90	70	40	20	10					
Onions	100	100	95	50	30					
Peanuts	90	70	70	10	0					
Peas	90	50	50	40	30					
Red Clover	100	100	90	40	30					
Safflower	50	50	40	30	30					
Snapbeans	90	60	60	40	40					
Sorghum	80	60	40	10	10					
Soybeans	100	90	80	40	30					
Squash	100	95	90	90	30					
Sugarbeets	20	20	20	10	0					
Tomatoes	100	100	90	80	80					
Turnips	100	90	40	10	0					
Crop Tox. Av.	86	74	64	38	21					
Weeds										
Crabgrass	100	90	50	30	10					
Ryegrass	100	95	95	40	40					
Other Grasses	95	95	80	40	10					
Mustard	100	95	90	60	10					
Pigweed	100	100	95	50	40					
Other brdlf	100	95	90	70	30					
Weed Tox. Av.	99	95	84	48	23					
Total Tox. Av.	88	79	68	40	21					

Less than 10% as active as 2,4-D

TABLE 4.--Logarithmic Rate Plot Results

Chemical	4,5,7-trichlorobenzthiadiazole-2,1,3									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	100	95	70	40	20					
B-ft trefoil	90	90	80	40	20					
Buckwheat	95	80	40	40	0					
Cabbage	40	40	40	30	0					
Corn, field	40	40	40	40	20					
Corn, sweet	40	40	30	30	10					
Cotton	50	50	50	50	20					
Flax	90	50	40	30	0					
Lima beans	95	50	50	50	40					
Oats	70	40	40	30	0					
Onions	100	50	40	40	40					
Peanuts	40	40	40	30	0					
Peas	40	40	40	40	20					
Red Clover	95	90	80	30	10					
Safflower	60	40	40	30	0					
Snapbeans	40	40	40	40	20					
Sorghum	40	40	40	30	0					
Soybeans	40	40	30	30	20					
Squash	80	50	40	40	40					
Sugarbeets	95	90	60	40	0					
Tomatoes	100	95	50	40	40					
Turnips	30	20	0	0	0					
Crop Tox. Av.	62	55	45	35	15					
Weeds										
Crabgrass	90	40	20	10	0					
Ryegrass	100	70	20	10	0					
Other Grasses	70	40	20	10	10					
Mustard	90	80	60	30	10					
Pigweed	100	95	80	10	10					
Other brdlf	95	90	80	70	60					
Weed Tox. Av.	91	69	47	23	15					
Total Tox. Av.	68	58	45	32	15					

Less than 10% as active as 2,4-D

TABLE 5.--Logarithmic Rate Plot Results

Chemical	3,5-diiodo-4-hydroxy benzonitrile									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	95	70	30	10	10	100	100	95	60	40
B-ft trefoil	60	60	50	20	10	100	100	95	60	40
Buckwheat	30	20	10	10	10	100	100	100	100	100
Cabbage	100	90	50	50	40	100	95	80	80	60
Corn, field	30	30	30	30	30	80	60	40	40	20
Corn, sweet	40	40	40	40	30	80	60	40	40	20
Cotton	50	50	40	40	30	100	95	90	80	70
Flax	30	10	0	0	0	100	100	95	70	60
Lima beans	70	50	40	40	40	95	80	70	60	40
Oats	40	30	30	30	30	40	30	10	10	0
Onions	90	90	40	30	20	100	90	80	70	40
Peanuts	50	50	10	10	10	40	20	10	0	0
Peas	70	40	40	40	40	100	100	100	100	100
Red Clover	60	60	50	20	10	100	100	95	60	40
Safflower	40	40	20	20	20	100	100	100	95	95
Snapbeans	60	40	30	30	30	95	80	70	60	40
Sorghum	40	20	20	20	20	80	60	40	40	20
Soybeans	40	30	20	20	10	95	80	60	40	20
Squash	50	50	30	30	30	100	100	100	95	95
Sugarbeets	100	90	40	20	10	100	100	95	80	70
Tomatoes	60	50	50	40	40	100	100	100	100	100
Turnips	100	100	80	40	20	95	90	80	80	60
Crop Tox. Av.	59	55	34	31	22	91	84	75	65	51
Weeds										
Crabgrass	30	30	20	20	20	20	10	0	0	0
Ryegrass	20	20	20	0	0	20	10	0	0	0
Other Grasses	30	30	20	20	20	20	10	10	10	0
Mustard	95	95	70	70	70	95	80	60	50	30
Pigweed	100	100	80	60	60	95	60	40	20	10
Other brdlf	80	80	60	60	40	95	90	80	70	60
Weed Tox. Av.	59	59	45	38	35	58	43	32	25	17
Total Tox. Av.	59	56	36	33	25	84	75	66	56	44

TABLE 6.--Logarithmic Rate Plot Results

Chemical	dimethylallyl-3-chlorophthalate									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	50	30	30	10	10	60	40	20	10	0
B-ft trefoil	50	40	30	30	30	60	40	20	10	0
Buckwheat	100	100	100	95	90	100	100	100	100	100
Cabbage	90	50	50	40	40	95	80	60	40	20
Corn, field	40	30	30	30	30	20	10	0	0	0
Corn, sweet	40	30	30	30	30	20	10	0	0	0
Cotton	50	40	40	30	30	60	50	40	20	10
Flax	40	30	20	20	20	10	10	0	0	0
Lima beans	70	70	50	50	50	100	100	95	90	90
Oats	40	30	20	20	20	10	10	0	0	0
Onions	30	30	30	30	20	10	10	0	0	0
Peanuts	50	30	30	20	20	40	20	10	0	0
Peas	40	40	40	40	40	100	100	95	90	90
Red Clover	50	40	30	30	30	60	40	20	10	0
Safflower	0	0	0	0	0	10	0	0	0	0
Snapbeans	70	50	40	40	40	100	100	95	90	90
Sorghum	40	30	30	30	30	40	20	10	0	0
Soybeans	40	40	40	40	30	95	90	80	40	10
Squash	100	95	70	60	60	95	95	90	80	70
Sugarbeets	60	40	40	30	20	90	80	60	40	20
Tomatoes	40	40	40	40	30	100	100	90	80	60
Turnips	95	50	30	10	10	95	80	60	40	20
Crop Tox. Av.	54	38	37	33	30	63	54	43	34	26
Weeds										
Crabgrass	40	30	30	30	30	10	10	0	0	0
Ryegrass	20	20	20	10	10	10	10	0	0	0
Other Grasses	40	30	30	30	30	60	40	20	10	0
Mustard	95	70	70	70	50	60	40	20	10	0
Pigweed	100	90	80	80	40	40	20	10	0	0
Other brdlf	80	70	70	60	60	90	80	70	40	20
Weed Tox. Av.	63	52	50	47	37	45	33	20	10	3
Total Tox. Av.	56	41	40	36	31	59	49	38	29	21

TABLE 7.--Logarithmic Rate Plot Results

Chemical	2,6-di-tert-butyl-p-tolyl methylcarbamate									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	40	10	10	10	10					
B-ft trefoil	80	70	50	50	40					
Buckwheat	20	20	20	20	20					
Cabbage	40	30	30	20	20					
Corn, field	40	40	40	40	30					
Corn, sweet	40	40	40	40	30					
Cotton	40	40	30	30	20					
Flax	20	20	20	20	20					
Lima beans	40	40	40	30	30					
Oats	50	40	40	40	40					
Onions	90	80	70	50	40					
Peanuts	10	10	10	10	0					
Peas	30	30	20	20	20					
Red Clover	80	70	50	50	40					
Safflower	50	40	40	40	40					
Snapbeans	40	30	30	30	30					
Sorghum	40	40	40	40	40					
Soybeans	50	50	40	40	30					
Squash	30	30	30	20	20					
Sugarbeets	30	30	30	30	30					
Tomatoes	30	30	30	20	20					
Turnips	0	0	0	0	0					
Crop Tox. Av.	40	36	31	30	26					
Weeds										
Crabgrass	95	95	90	90	90					
Ryegrass	90	70	70	50	40					
Other Grasses	95	50	40	40	40					
Mustard	60	30	30	30	30					
Pigweed	100	95	80	40	40					
Other brdlf	90	70	60	60	50					
Weed Tox. Av.	88	68	62	52	48					
Total Tox. Av.	50	43	38	34	31					

Less than 10% as active as 2,4-D

TABLE 8.--Logarithmic Rate Plot Results

Chemical	propynyl N-(3-chlorophenyl)carbamate									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	0	0	0	0	0	0	0	0	0	0
B-ft trefoil	0	0	0	0	0	10	0	0	0	0
Buckwheat	0	0	0	0	0	60	40	20	10	0
Cabbage	0	0	0	0	0	0	-	-	-	-
Corn, field	0	0	0	0	0	80	60	40	0	0
Corn, sweet	0	0	0	0	0	80	60	40	0	0
Cotton	0	0	0	0	0	0	0	0	0	0
Flax	0	0	0	0	0	40	20	10	0	0
Lima beans	0	0	0	0	0	0	0	0	0	0
Oats	100	40	10	0	0	95	95	40	0	0
Onions	0	0	0	0	0	10	0	0	0	0
Peanuts	0	0	0	0	0	0	0	0	0	0
Peas	0	0	0	0	0	30	20	10	0	0
Red Clover	0	0	0	0	0	10	0	0	0	0
Safflower	0	0	0	0	0	20	10	0	0	0
Snapbeans	0	0	0	0	0	30	20	10	0	0
Sorghum	0	0	0	0	0	80	60	20	0	0
Soybeans	0	0	0	0	0	20	10	0	0	0
Squash	0	0	0	0	0	70	40	20	10	0
Sugarbeets	0	0	0	0	0	0	0	0	0	0
Tomatoes	0	0	0	0	0	20	10	0	0	0
Turnips	0	0	0	0	0	0	0	0	0	0
Crop Tox. Av.	5	2	0	0	0	31	21	10	1	0
Weeds										
Crabgrass	0	0	0	0	0	30	20	10	0	0
Ryegrass	100	95	80	60	40	95	90	70	40	20
Other Grasses	0	0	0	0	0	20	10	0	0	0
Mustard	0	0	0	0	0	20	10	0	0	0
Pigweed	0	0	0	0	0	0	0	0	0	0
Other brdlf	0	0	0	0	0	60	40	20	10	0
Weed Tox. Av.	15	14	11	9	6	38	28	17	8	3
Total Tox. Av.	7	5	3	2	1	33	23	11	2	0

TABLE 9.--Logarithmic Rate Plot Results

Chemical	sec-butyl N-(3-chlorophenyl)carbamate									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	70	60	30	10	0					
B-ft trefoil	95	80	70	40	20					
Buckwheat	100	100	95	80	60					
Cabbage	95	90	50	10	0					
Corn, field	50	50	20	0	0					
Corn, sweet	50	50	20	0	0					
Cotton	30	30	10	0	0					
Flax	95	90	20	10	0					
Lima beans	40	40	30	30	10					
Oats	95	90	80	40	20					
Onions	70	50	10	10	0					
Peanuts	30	10	10	0	0					
Peas	40	30	0	0	0					
Red Clover	95	80	70	40	20					
Safflower	10	0	0	0	0					
Snapbeans	40	30	20	20	10					
Sorghum	95	70	40	20	10					
Soybeans	40	40	20	20	10					
Squash	50	40	20	20	10					
Sugarbeets	80	60	30	10	0					
Tomatoes	100	100	70	40	10					
Turnips	95	80	20	0	0					
Crop Tox. Av.	67	58	33	18	8					
Weeds										
Crabgrass	95	90	40	10	0					
Ryegrass	100	95	90	50	10					
Other Grasses	95	90	50	20	10					
Mustard	100	95	80	30	10					
Pigweed	100	70	20	20	10					
Other brdlf	90	90	50	30	20					
Weed Tox. Av.	97	89	55	27	10					
Total Tox. Av.	73	64	38	20	9					

Less than 10% as active as 2,4-D

TABLE 10.--Logarithmic Rate Plot Results

Chemical	α-carboisopropoxyethyl N-phenylcarbamate									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	0	0	0	0	0					
B-ft trefoil	30	0	0	0	0					
Buckwheat	100	95	60	10	0					
Cabbage	0	0	0	0	0					
Corn, field	95	30	0	0	0					
Corn, sweet	95	30	0	0	0					
Cotton	0	0	0	0	0					
Flax	95	60	10	10	0					
Lima beans	0	0	0	0	0					
Oats	100	95	50	20	0					
Onions	0	0	0	0	0					
Peanuts	0	0	0	0	0					
Peas	0	0	0	0	0					
Red Clover	30	0	0	0	0					
Safflower	0	0	0	0	0					
Snapbeans	0	0	0	0	0					
Sorghum	40	40	0	0	0					
Soybeans	0	0	0	0	0					
Squash	10	0	0	0	0					
Sugarbeets	0	0	0	0	0					
Tomatoes	0	0	0	0	0					
Turnips	0	0	0	0	0					
Crop Tox. Av.	27	16	5	2	0					
Weeds										
Crabgrass	30	0	0	0	0					
Ryegrass	100	90	70	20	0					
Other Grasses	30	0	0	0	0					
Mustard	50	0	0	0	0					
Pigweed	30	0	0	0	0					
Other brdlf	50	10	0	0	0					
Weed Tox. Av.	48	17	12	3	0					
Total Tox. Av.	32	16	7	2	0					

Less than 10% as active as 2,4-D

TABLE 11.--Logarithmic Rate Plot Results

Chemical	α-carboisopropoxyethyl N-(3-chlorophenyl)carbamate									
Application	Preemergence					Postemergence				
Rate lb/A	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	0	0	0	0	0					
B-ft trefoil	60	40	20	10	0					
Buckwheat	100	100	100	95	70					
Cabbage	80	60	40	30	10					
Corn, field	90	50	20	10	10					
Corn, sweet	90	50	20	10	10					
Cotton	40	20	20	20	20					
Flax	95	80	40	20	20					
Lima beans	0	0	0	0	0					
Oats	90	50	30	20	20					
Onions	0	0	0	0	0					
Peanuts	70	60	50	50	30					
Peas	0	0	0	0	0					
Red Clover	60	40	20	10	0					
Safflower	0	0	0	0	0					
Snapbeans	0	0	0	0	0					
Sorghum	90	50	20	10	10					
Soybeans	40	0	0	0	0					
Squash	0	0	0	0	0					
Sugarbeets	90	90	70	70	30					
Tomatoes	100	70	60	50	20					
Turnips	20	10	10	0	0					
Crop Tox. Av.	51	33	24	18	11					
Weeds										
Crabgrass	60	30	20	20	20					
Ryegrass	95	70	60	60	20					
Other Grasses	80	30	20	20	20					
Mustard	95	70	40	0	0					
Pigweed	50	20	0	0	0					
Other brdlf	70	60	50	30	10					
Weed Tox. Av.	75	47	32	22	12					
Total Tox. Av.	56	36	25	19	11					

Less than 10% as active as 2,4-D

TABLE 12.--Logarithmic Rate Plot Results

Chemical	ethyl N-ethyl-N-cyclohexylthiolcarbamate									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	100	100	80	50	0					
B-ft trefoil	95	95	90	80	60					
Buckwheat	95	95	70	60	50					
Cabbage	95	95	80	50	30					
Corn, field	40	30	20	10	10					
Corn, sweet	40	30	20	10	10					
Cotton	80	60	60	60	40					
Flax	95	100	90	80	50					
Lima beans	100	95	95	70	70					
Oats	100	95	95	50	50					
Onions	100	95	90	50	40					
Peanuts	60	30	30	30	0					
Peas	60	60	60	40	20					
Red Clover	95	95	90	80	60					
Safflower	60	30	30	10	0					
Snapbeans	30	30	30	10	0					
Sorghum	95	95	40	30	20					
Soybeans	90	80	70	40	40					
Squash	95	95	90	80	40					
Sugarbeets	40	30	30	30	0					
Tomatoes	95	60	40	30	30					
Turnips	95	95	80	30	0					
Crop Tox. Av.	80	72	63	45	28					
Weeds										
Crabgrass	100	100	95	90	90					
Ryegrass	100	100	95	95	90					
Other Grasses	100	100	95	90	90					
Mustard	100	95	90	95	90					
Pigweed	100	100	70	0	0					
Other brdlf	95	95	95	90	90					
Weed Tox. Av.	99	99	90	77	75					
Total Tox. Av.	84	79	69	51	38					

Less than 10% as active as 2,4-D

TABLE 13.--Logarithmic Rate Plot Results

Chemical	4-chlorobenzenesulfono-2-toluidine									
Application	Preemergence					Postemergence				
Rate lb/A	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	0	0	0	0	0					
B-ft trefoil	90	80	40	20	10					
Buckwheat	60	0	0	0	0					
Cabbage	0	0	0	0	0					
Corn, field	50	30	10	10	10					
Corn, sweet	50	30	10	10	10					
Cotton	70	40	30	20	20					
Flax	70	10	0	0	0					
Lima beans	90	60	40	40	30					
Oats	70	10	0	0	0					
Onions	100	100	40	40	20					
Peanuts	60	10	0	0	0					
Peas	40	30	20	0	0					
Red Clover	80	80	40	20	10					
Safflower	10	0	0	0	0					
Snapbeans	10	0	0	0	0					
Sorghum	50	30	0	0	0					
Soybeans	50	10	10	0	0					
Squash	90	60	50	40	30					
Sugarbeets	0	0	0	0	0					
Tomatoes	80	30	20	20	20					
Turnips	0	0	0	0	0					
Crop Tox. Av.	51	28	14	10	7					
Weeds										
Crabgrass	60	40	40	20	0					
Ryegrass	95	20	0	0	0					
Other Grasses	70	50	50	30	10					
Mustard	100	95	90	60	40					
Pigweed	10	0	0	0	0					
Other brdlf	70	50	50	20	20					
Weed Tox. Av.	66	43	38	22	12					
Total Tox. Av.	54	31	19	12	8					

Less than 10% as active as 2,4-D

TABLE 14.--Logarithmic Rate Plot Results

Chemical	mixed 2-(X,X-dichlorobenzylthio)-4,6-dimethylpyrimidine									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	95	50	40	40	30					
B-ft trefoil	95	70	60	40	20					
Buckwheat	95	70	60	40	30					
Cabbage	95	90	70	40	20					
Corn, field	0	0	0	0	0					
Corn, sweet	0	0	0	0	0					
Cotton	40	30	30	30	30					
Flax	80	40	20	30	20					
Lima beans	90	70	50	50	40					
Oats	50	30	30	30	20					
Onions	70	50	50	40	40					
Peanuts	40	0	0	0	0					
Peas	40	40	40	30	30					
Red Clover	95	70	60	40	20					
Safflower	40	40	40	40	30					
Snapbeans	70	40	40	30	20					
Sorghum	40	20	30	30	10					
Soybeans	50	30	30	30	20					
Squash	60	50	50	50	40					
Sugarbeets	50	40	40	40	40					
Tomatoes	95	40	40	40	40					
Turnips	95	70	40	20	10					
Crop Tox. Av.	63	43	37	31	23					
Weeds										
Crabgrass	50	40	30	10	10					
Ryegrass	70	30	20	0	0					
Other Grasses	40	30	20	20	10					
Mustard	90	90	90	80	60					
Pigweed	80	70	50	40	30					
Other brdlf	95	70	60	40	30					
Weed Tox. Av.	71	55	45	32	23					
Total Tox. Av.	65	45	39	31	23					

Less than 10% as active as 2,4-D

TABLE 15.--Logarithmic Rate Plot Results

Chemical	N-(β-O,O-diisopropyldithiophosphoryethyl)-benzenesulfonamide									
Application	Preemergence					Postemergence				
Rate lb/A (	20	10	5	2 1/2	1 1/4	20	10	5	2 1/2	1 1/4
Crops										
Alfalfa	0	0	0	0	0					
B-ft trefoil	60	50	50	30	20					
Buckwheat	100	95	60	30	0					
Cabbage	30	30	30	0	0					
Corn, field	40	20	20	20	20					
Corn, sweet	50	20	20	20	20					
Cotton	40	40	40	40	30					
Flax	0	0	0	0	0					
Lima beans	40	40	30	30	30					
Oats	40	30	0	0	0					
Onions	100	40	40	40	40					
Peanuts	100	40	30	30	10					
Peas	30	30	0	0	0					
Red Clover	60	50	50	30	20					
Safflower	30	30	20	30	30					
Snapbeans	30	30	0	0	0					
Sorghum	60	40	40	40	0					
Soybeans	30	30	30	30	20					
Squash	80	60	50	50	40					
Sugarbeets	100	100	95	70	0					
Tomatoes	40	40	20	20	20					
Turnips	-	-	-	-	-					
Crop Tox. Av.	53	39	30	24	14					
Weeds										
Crabgrass	80	70	50	50	40					
Ryegrass	90	80	70	40	20					
Other Grasses	70	60	50	50	40					
Mustard	90	90	60	60	60					
Pigweed	100	95	80	20	0					
Other brdlf	95	90	60	60	50					
Weed Tox. Av.	89	81	63	47	35					
Total Tox. Av.	61	48	37	29	19					

Less than 10% as active as 2,4-D

TABLE 16.--Logarithmic Rate Plot Results

Chemical	4-amino-3,5,6-trichloropicolinic acid									
Application	Preemergence					Postemergence				
Rate lb/A (	2	1	1/2	1/4	1/8	2	1	1/2	1/4	1/8
Crops										
Alfalfa	100	100	100	100	100	100	100	100	100	100
B-ft trefoil	100	100	100	100	100	100	100	100	100	100
Buckwheat	100	100	100	100	95	100	100	100	100	95
Cabbage	95	95	90	80	60	50	30	20	10	0
Corn, field	95	95	95	70	60	10	10	0	0	0
Corn, sweet	95	95	95	70	60	10	10	0	0	0
Cotton	100	100	100	100	100	100	100	100	100	100
Flax	100	100	100	100	95	100	95	95	95	90
Lima beans	100	100	100	100	100	100	100	100	100	100
Oats	100	95	95	50	40	10	10	0	0	0
Onions	100	100	100	100	100	100	95	80	40	10
Peanuts	100	100	100	100	100	100	100	100	100	95
Peas	100	100	100	100	100	100	100	100	100	100
Red Clover	100	100	100	100	100	100	100	100	100	100
Safflower	100	100	100	100	100	100	100	100	95	90
Snapbeans	100	100	100	100	100	100	100	100	100	100
Sorghum	100	100	100	100	100	10	10	0	0	0
Soybeans	100	100	100	100	100	100	100	100	100	100
Squash	100	100	95	95	95	100	95	95	95	90
Sugarbeets	100	100	100	100	100	100	100	100	100	95
Tomatoes	100	100	100	100	100	100	100	100	100	100
Turnips	-	-	-	-	-	50	30	20	20	10
Crop Tox. Av.	99	99	99	94	78	79	77	73	71	67
Weeds										
Crabgrass	95	95	95	80	70	40	20	10	0	0
Ryegrass	95	95	95	95	50	40	20	10	0	0
Other Grasses	95	95	95	80	70	20	10	0	0	0
Mustard	100	100	100	95	90	95	80	60	40	10
Pigweed	100	100	100	95	95	95	95	95	90	80
Other brdlf	100	100	100	100	100	95	90	80	60	40
Weed Tox. Av.	98	98	98	91	79	64	53	43	32	22
Total Tox. Av.	99	99	98	93	78	76	71	67	62	57

TABLE 17.--Logarithmic Rate Plot Results

Chemical	alkanolamine salts of 2,4-dichlorophenoxyacetic acid									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	100	100	100	95	95	100	100	100	100	100
B-ft trefoil	100	100	95	95	90	100	100	100	100	100
Buckwheat	80	70	70	40	40	100	100	100	95	95
Cabbage	100	100	95	95	95	100	100	100	95	90
Corn, field	95	95	70	60	50	20	20	10	0	0
Corn, sweet	95	95	90	60	60	20	20	10	0	0
Cotton	95	95	95	80	60	100	100	100	100	100
Flax	100	95	95	80	70	100	100	100	100	100
Lima beans	100	100	100	100	100	100	100	100	100	100
Oats	95	95	70	70	50	40	20	10	10	0
Onions	100	100	100	100	100	100	100	100	100	100
Peanuts	40	40	40	40	40	95	95	90	80	60
Peas	100	100	100	90	60	100	100	100	100	100
Red Clover	100	100	95	95	90	100	100	100	100	100
Safflower	100	100	95	90	60	100	100	100	100	100
Snapbeans	95	95	95	60	40	100	100	100	95	90
Sorghum	100	100	100	95	90	40	20	10	10	0
Soybeans	95	90	80	40	30	100	100	100	100	100
Squash	100	100	95	95	90	95	90	90	80	60
Sugarbeets	100	100	100	100	100	100	100	100	95	90
Tomatoes	100	100	100	70	50	100	100	100	100	100
Turnips	100	100	95	95	95	100	100	100	95	90
Crop Tox. Av.	95	94	90	79	71	87	85	83	80	76
Weeds										
Crabgrass	95	90	90	90	70	40	30	20	10	0
Ryegrass	90	90	70	60	30	40	20	10	0	0
Other Grasses	95	90	90	90	90	40	20	10	10	0
Mustard	100	95	95	95	90	100	100	100	100	95
Pigweed	100	100	95	50	40	100	100	100	100	100
Other brdlf	95	90	90	90	70	100	100	100	95	90
Weed Tox. Av.	96	93	89	79	65	70	62	57	53	48
Total Tox. Av.	95	94	89	79	70	83	80	77	74	70

TABLE 18.--Logarithmic Rate Plot Results

Chemical	isopropyl N-(3-chlorophenyl)carbamate									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	95	80	30	30	20	90	60	40	20	10
B-ft trefoil	100	100	95	90	80	60	40	20	10	0
Buckwheat	100	100	100	95	95	60	40	20	20	10
Cabbage	100	100	80	50	20	95	60	40	20	10
Corn, field	95	95	50	50	40	40	40	20	10	0
Corn, sweet	95	95	50	50	40	40	40	20	10	0
Cotton	40	30	30	30	30	80	60	20	10	0
Flax	100	100	95	80	30	50	30	10	10	0
Lima beans	100	90	90	80	80	80	80	60	40	20
Oats	100	95	95	80	30	80	60	20	0	0
Onions	100	100	100	80	40	60	40	20	10	0
Peanuts	70	50	30	30	0	20	10	0	0	0
Peas	80	60	40	30	20	40	20	10	0	0
Red Clover	100	100	95	90	80	60	40	20	10	0
Safflower	0	0	0	0	0	40	20	10	0	0
Snapbeans	30	30	20	20	20	80	80	60	40	20
Sorghum	95	95	90	60	20	80	60	20	10	0
Soybeans	50	30	20	20	20	50	30	20	10	0
Squash	95	80	70	60	60	95	80	60	20	10
Sugarbeets	95	95	70	40	10	60	40	20	0	0
Tomatoes	100	100	100	90	30	40	20	10	0	0
Turnips	100	100	90	10	0	90	60	30	10	0
Crop Tox. Av.	84	80	66	53	35	63	46	25	12	4
Weeds										
Crabgrass	100	95	80	50	30	90	40	10	0	0
Ryegrass	100	100	90	80	40	100	60	20	10	0
Other Grasses	100	95	80	60	40	70	30	10	0	0
Mustard	100	100	95	90	70	95	70	30	0	0
Pigweed	100	80	40	30	30	60	40	30	20	10
Other brdlf	100	95	80	60	40	40	20	10	0	0
Weed Tox. Av.	100	94	78	62	42	76	43	17	5	2
Total Tox. Av.	87	83	68	55	36	66	45	23	10	3

TABLE 19.--Logarithmic Rate Plot Results

Chemical	alkanolamine salts of 4,6-dinitro-o-sec-butylphenol									
Application	Preemergence					Postemergence				
Rate lb/A (	8	4	2	1	1/2	8	4	2	1	1/2
Crops										
Alfalfa	95	30	20	10	0	70	60	40	40	20
B-ft trefoil	95	90	80	70	70	100	100	100	80	60
Buckwheat	95	70	60	40	10	100	100	95	95	90
Cabbage	100	95	30	30	30	100	100	100	100	95
Corn, field	30	30	30	30	20	80	60	50	40	30
Corn, sweet	30	30	30	30	20	80	60	50	40	30
Cotton	50	40	40	40	40	95	90	80	50	30
Flax	80	30	30	20	20	95	90	50	20	10
Lima beans	95	80	80	70	70	80	70	60	40	20
Oats	40	30	20	20	10	80	60	40	20	10
Onions	100	90	90	50	50	100	100	95	60	40
Peanuts	70	40	30	20	20	40	20	10	0	0
Peas	40	20	10	10	10	80	70	70	60	50
Red Clover	90	90	80	70	70	100	100	100	80	60
Safflower	80	30	10	10	10	100	100	100	80	60
Snapbeans	50	40	30	20	20	80	70	60	40	20
Sorghum	40	30	30	30	20	60	40	20	10	0
Soybeans	40	40	40	30	30	100	100	95	90	70
Squash	60	50	50	50	50	100	95	80	60	40
Sugarbeets	95	90	80	50	50	100	100	100	95	90
Tomatoes	100	100	100	70	70	100	100	100	100	100
Turnips	100	95	30	10	10	100	100	95	60	40
Crop Tox. Av.	72	56	46	35	32	88	81	72	57	44
Weeds										
Crabgrass	60	50	40	30	10	20	10	0	0	0
Ryegrass	30	20	20	20	20	95	90	80	40	20
Other Grasses	70	50	40	30	10	20	10	0	0	0
Mustard	100	100	90	90	90	100	100	95	60	40
Pigweed	20	20	20	20	20	100	100	100	95	90
Other brdlf	90	70	70	70	50	100	100	100	95	95
Weed Tox. Av.	62	52	47	43	33	73	68	63	48	41
Total Tox. Av.	69	55	46	37	32	85	79	70	55	43

TABLE 20.--Summary table of preemergence logarithmic plots showing chemical tolerated by crop and their control of broadleaf weeds and weed-grasses. 1/

Chemical		5-bromo-6-methyl-3-phenyluracil Table (1)		3-cyclohexyl-5,6-trimethylene-uracil (2)		1-phenyl-4-amino-5-chloropyri-dazone-6 (3)		4,5,7-trichlorobenzthiadiazole -2,1,3 (4)		3,5-diiodo-4-hydroxy ben-zonitrile (5)		dimethylallyl-3-chlorophthalate (6)		2,6-di-*tert*-butyl-*p*-tolyl methylcarbamate (7)		propynyl *N*-(3-chlorophenyl) carbamate (8)		*sec*-butyl *N*-(3-chlorophenyl) carbamate (9)	
Weeds		Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses
	Crops																		
Small Seeded Legume Crops	Alfalfa			X	X					X				X	X				
	B-ft. trefoil									X		X							
	Red Clover							X		X									
Cereals and Forage Crops	Buckwheat									X				X	X				
	Corn, field			X	X					X		X			X				
	Oats			X	X			X		X		X				X			
	Sorghum			X	X			X		X		X							
Oilseed and Fiber Crops	Cotton									X		X		X	X			X	X
	Flax	X	X	X	X			X		X		X		X	X				
	Peanuts			X	X			X		X		X		X	X			X	X
	Safflower	X	X	X	X			X		X		X						X	X
	Soybeans							X		X					X				
Sugar Crops	Sugarbeets			X	X	X	X			X		X		X	X				
Vegetable Crops	Cabbage							X						X	X				
	Corn, sweet							X		X		X			X				
	Lima beans														X				
	Onions									X		X							
	Peas													X	X			X	X
	Snapbeans									X				X	X			X	X
	Squash									X				X	X				
	Tomatoes													X	X				
	Turnips							X	X	X		X		X	X			X	X

1/ Checks are placed opposite crops that tolerated respective chemicals (Phytotoxicity index, 30 or less) in which broadleaf weeds or weed-grasses were controlled (Phytotoxicity index, 70 or more).

Table 20.--Continued

	Chemical	α-carboisopropoxyethyl N -phenylcarbamate (10)		α-carboisopropoxyethyl N-(3 -chlorophenyl)carbamate (11)		ethyl N-ethyl-N-cyclohexyl-thiolcarbamate (12)		4-chlorobenzenesulfono-2 -toluidine (13)		mixed 2-(X,X-dichlorobenzylthio) -4,6-dimethylpyrimidine (14)		N-(β-O,O-diisopropyldithiophos-phorylethyl)-benzenesulfonamide (15)		4-amino-3,5,6-trichloropico-linic acid (16)		Alkanolamine salts of 2,4-di-chlorophenoxyacetic acid (17)		isopropyl N-(3-chlorophenyl) carbamate (18)		Alkanolamine salts of 4,6-di-nitro-o-sec-butylphenol (19)	
	Weeds	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses
	Crops																				
Small Seeded Legume Crops	Alfalfa		X	X	X	X	X	X	X			X	X	Very active, not tolerated by test species at rates used.				X	X	X	
	B-ft.trefoil		X																		
	Red Clover		X																		
Cereals and Forage Crops	Buckwheat		X					X												X	
	Corn, field		X			X	X	X		X	X	X	X							X	X
	Oats							X		X		X	X					X		X	
	Sorghum		X			X	X	X		X								X			
Oilseed and Fiber Crops	Cotton		X	X	X			X		X								X	X		
	Flax		X					X		X		X	X					X		X	
	Peanuts		X			X	X	X		X		X	X					X	X	X	
	Safflower		X	X	X	X	X	X	X			X	X					X	X	X	
	Soybeans		X	X	X			X		X		X	X			X	X	X	X	X	
Sugar Crops	Sugarbeets		X			X	X	X	X									X			
Vegetable Crops	Cabbage		X			X	X	X	X			X	X					X		X	
	Corn, sweet		X			X	X	X		X	X	X	X							X	X
	Lima beans		X	X	X							X	X								
	Onions		X	X	X																
	Peas		X	X	X	X	X	X		X		X	X					X	X	X	
	Snapbeans		X	X	X	X	X	X	X	X		X	X					X	X	X	
	Squash		X	X	X																
	Tomatoes		X			X	X	X				X	X					X			
	Turnips		X	X	X	X	X	X	X	X								X	X	X	

1/ Checks are placed opposite crops that tolerated respective chemicals (Phytotoxicity index, 30 or less) in which broadleaf weeds or weed-grasses were controlled (Phytotoxicity index, 70 or more).

TABLE 21.--Summary table of postemergence logarithmic plots showing chemical tolerated by crop and their control of broadleaf weeds and weed-grasses. 1/

Chemical		5-bromo-6-methyl-3-phenyluracil Table (1)		3-cyclohexyl-5,6-trimethylene-uracil (2)		1-phenyl-4-amino-5-chloropyridazone-6 (3)		4,5,7-trichlorobenzthiadiazole -2,1,3 (4)		3,5-diiodo-4-hydroxy benzonitrile (5)		dimethylallyl-3-chlorophthalate (6)		2,6-di-tert-butyl-p-tolyl methylcarbamate (7)		propynyl N-(3-chlorophenyl) carbamate (8)		sec-butyl N-(3-chlorophenyl) carbamate (9)	
Weeds		Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses
	Crops			Relatively Inactive		Relatively Inactive		Relatively Inactive						Relatively Inactive				Relatively Inactive	
Small Seeded Legume Crops	Alfalfa											X				X			
	B-ft. trefoil											X				X			
	Red Clover											X				X			
Cereals and Forage Crops	Buckwheat															X			
	Corn, field											X							
	Oats											X							
	Sorghum											X				X			
Oilseed and Fiber Crops	Cotton															X			
	Flax		X									X				X			
	Peanuts		X							X		X				X			
	Safflower											X				X			
	Soybeans															X			
Sugar Crops	Sugarbeets															X			
Vegetable Crops	Cabbage																		
	Corn, sweet											X							
	Lima beans															X			
	Onion											X				X			
	Peas															X			
	Snapbeans															X			
	Squash															X			
	Tomatoes															X			
	Turnips																		

1/ Checks are placed opposite crops that tolerated respective chemicals (Phytotoxicity index, 30 or less) in which broadleaf weeds or weed-grasses were controlled (Phytotoxicity index, 70 or more).

Table 21.--Continued

Crop group	Chemical / Weeds / Crops	α-carboisopropoxyethyl N -phenylcarbamate (10)		α-carboisopropoxyethyl N-(3 -chlorophenyl)carbamate (11)		ethyl N-ethyl-N-cyclohexyl-thiolcarbamate (12)		4-chlorobenzenesulfono-2 -toluidine (13)		mixed 2-(X,X-dichlorobenzylthio -4,6-dimethylpyrimidine (14)		N-β-O,O-diisopropyldithiophos-phoryethyl)-benzenesulfonamide (15)		4-amino-3,5,6-trichloropico-linic acid (16)		Alkanolamine salts of 2,4-di-chlorophenoxyacetic acid (17)		isopropyl N-(3-chlorophenyl) carbamate (18)		Alkanolamine salts of 4,6-di-nitro-o-sec-butylphenol (19)	
	Weeds	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses	Brdlf.	Grasses
	Crops																				
Small Seeded Legume Crops	Alfalfa																			X	
	B-ft. trefoil																				
	Red Clover																				
Cereals and Forage Crops	Buckwheat																				
	Corn, field													X		X				X	
	Oats													X		X				X	
	Sorghum													X		X				X	
Oilseed and Fiber Crops	Cotton																			X	
	Flax	Relatively Inactive		Relatively Inactive		Relatively Inactive		Relatively Inactive		Relatively Inactive								X		X	
	Peanuts																	X	X,	X	
	Safflower																	X			
	Soybeans																	X			
Sugar Crops	Sugarbeets																				
Vegetable Crops	Cabbage													X							
	Corn, sweet													X		X				X	
	Lima beans																			X	
	Onions													X							
	Peas																	X			
	Snapbeans																			X	
	Squash																				
	Tomatoes																	X			
	Turnips													X							

1/ Checks are placed opposite crops that tolerated respective chemicals (Phytotoxicity index, 30 or less) in which broadleaf weeds or weed-grasses were controlled (Phytotoxicity index, 70 or more).